PEACE/WILLISTON
FISH & WILDLIFE
COMPENSATION
PROGRAM

BC hydro

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A Reconnaissance Survey Of Butternut Lake

D. A. Jesson
1990

PWFWCP Report No. 99

The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

Peace/Williston Fish and Wildlife Compensation Program, 1011 Fourth Ave. 3rd Floor, Prince George B.C. V2L 3H9

Website: *www.bchydro.bc.ca/environment/initiatives/pwcp/*

This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

Citation: D. A. Jesson. 1990. A reconnaissance survey of Butternut Lake. Peace/Williston Fish and Wildlife Compensation Program, Report No. 99. 21pp plus appendices.

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105-02863/

A RECONNAISSANCE SURVEY OF

BUTTERNUT LAKE

WATERSHED: PACK RIVER

DATE OF SURVEY: JUNE 20. 21. 22. 1990

FIELD CREW LEADER: D. A. JESSON

FIELD ASSISTANT: A. R. MCLEAN

REPORT PREPARED BY: D. A. JESSON

WILLISTON FISHERIES PROJECT

B. C. HYDRO

ENVIRONMENTAL RESOURCES

and

MINISTRY OF ENVIRONMENT

RECREATIONAL FISHERIES BRANCH

RELEASED BY: _____

D.H.G. Ableson, Regional Fisheries Biologist

LAKE: **BUTTERNUT**

SYSTEM NAME: UNNAMED C.

A.S.A.P. REFERENCE NO.:

SYSTEM NO: 25-1200-050-010

DATA ON FILE FOR THIS SURVEY

Location	x	Dissolved O2/Temp. Profiles	x
Physical Data	x	Winter Dissolved 02/Temp. Profiles	
Bench Mark	x	Netting Record	x
Terrain Features	x	Lake Catch Summary	x
Access	x	Individual Fish Data	x
Resorts and Campsites	x	Fish Preserved	
Other Developments	x	Stomach Analysis	x
Obstructions and Pollutions	x	Scale Reading	x
Special Restrictions	x	Location of Inventory Sites	x
Aquatic Plants	x	Photograph Directory	x
Wildlife Observations	x	Appendices:	
Miscellaneous Comments	x	A: Water Chemistry Analysis	x
Lake Drainage	x	B: Tributary Stream Data	
Fisheries Management Comments	x	Bathymetric Map Reduction	x
History of Previous Surveys	x	Bathymetric Map	x
Water Chemistry Summary	x		

LOCATION

Location:	34 km south of Mackenzie		
Elevation:	747 m +/-		
Latitude/Longitude:	50°00'52":123°05'40"	U.T.M.:	10.4940.60962
Management Unit:	7-24	N.T.S. Map No.:	930/3

Drainage: Outlet C. --> possible subterranean flow --> Holder C. --> Pack R. --> Tudyah L.-->Pack R.-->Williston L. (Parsnip Reach)-->Peace R.

PHYSICAL DATA

Lake Drainage Area:		Volume:	2,520,000 m^3
Water Surface Area:	355,000 m^2	Flushing Rate:	
Area above 6 m contour:	110,000m^2	Perimeter of Islands:	
Shoreline Perimeter:	3,470 m	Number of Islands:	0
Maximum Depth:	12.0m	Mean Depth:	7.1 m
Filterable Residue (TDS):	60 mg/l	Secchi Reading:	8.35 m

Sounding Device: Lowrance X-15 Elevation Source: Contour interpolation

BENCHMARK

(Iron spike, center of red circle) located 2.0 m above present water level in a 35 cm diameter Lodgepole pine. The tree is located at the most northern end of the lake, 5.5 m from the present water's edge.

High water mark: 0.06 m above water level at time of survey.

Lake: **BUTTERNUT**

TERRAIN FEATURES

Immediate Shoreline:

The lake is treed to the water's edge. Grasses and alder front the shoreline. Elevated lake levels have flooded foreshore areas, submerging the lower trunks of alder, while causing some larger spruce trees to drown. The shoreline is steeply sloped to the water's edge around the entire lake, except for the low sloping most northern shore. Bedrock outcrops are present along the west shore. Shoreline access by foot is restricted to the northern shore (proposed recreation site location). Boat access to the shoreline is fair. Boating near shore can be hazardous with deadfall present around much of the shoreline perimeter. The lake bottom drops off quickly from shore (especially the west shore), except for the shallow north bay. Shoreline substrate is predominantly sand and gravels with an overlying layer of silt. The north bay is almost 100% organics.

Surrounding Country:

Butternut Lake is surrounded by low rolling hills, except for flat terrain to the north and bedrock cliffs to the northwest. A microwave dish is visible on the bedrock cliffs. Forest cover is mature first growth consisting of a mixture of spruce, paper birch, Lodgepole pine and balsam fir. Forest cover is complete and dense except for an open Lodgepole pine forest to the north.

Butternut Lake is situated within the sub-boreal spruce bio-geoclimatic zone.

Lake: **BUTTERNUT**

ACCESS

Directions:

At present there is no road access to Butternut Lake.

Ministry of Forests, Mackenzie, has indicated that road access will be established to the north end of the lake in 1991 through a proposed small business cut block.

Butternut Lake is a 10 minute helicopter ride from Windy Point.

Road Type and Conditions:

Not applicable.

Restrictions:

None known.

RESORTS AND CAMPSITES

None. Ministry of Forests Recreation Office (Mackenzie), Jim Ladds, has indicated a recreation site is proposed for the north end of the lake pending development of access. The north end is well suited for a recreation site due to the open nature of the Lodgepole pine forest and low sloping terrain.

OTHER DEVELOPMENTS

A microwave dish is situated on top of the bedrock cliff on the NW shore.

Lake: **BUTTERNUT**

OBSTRUCTIONS AND POLLUTIONS

A beaver dam on the outlet located approximately 20 m downstream of the lake is an obstruction to upstream fish passage. The dam is 7.1 m long and 0.8 m high. Seven additional small beaver dams occur on the outlet over the initial 200 m downstream from the lake. The dams range from 1 to 3 m in length and up to 0.6 m in height. None appear to be active.

SPECIAL RESTRICTIONS

None known.

AQUATIC PLANTS

Aquatic plants are sparse and occur primarily near shore. The south shore is the most heavily populated area. A greater abundance of plant life is expected later on in summer.

The following species were identified in the field. None were collected:

Equisetum fluviatile	sedge grass
Potamogeton richardsonii	

WILDLIFE OBSERVATIONS

Five gulls, 2 eagles, one diving duck, and one beaver were sighted.

MISCELLANEOUS COMMENTS

A large school of lake chub (500+) was observed near shore at the north end of the lake.

Some patches of exposed gravel were observed near shore, possibly the result of shore spawning longnose suckers.

Bathymetric map: The lake outline is from an enlargement of aerial photograph BC 7443 No. 191, flown September 3, 1972.

Lake: **BUTTERNUT**

LAKE DRAINAGE

General:

Butternut Lake has no inlets and one outlet. NTS map 93-03, edition 3, indicates the outlet flows north 600 m to its confluence with Holder Creek. Holder Creek flows east 3.5 km into the Pack River.

Major Systems:

There are no major systems.

Minor Systems:

unnamed C. - outlet

The outlet drains the lake at the north end. Approximately 8 small beaver dams are present over the initial 200 m of outlet, downstream from the lake. The first and largest dam is located approximately 20 m downstream from the lake. The dam is 7.1 m in length and 0.8 m in height. The remaining dams range from 1 to 3 m in length and up to 0.6 m in height. All dams appear to be inactive.

At a sample site located 5 m downstream from the first beaver dam (25 m downstream of lake), the average wetted width is 5.1 m and the average depth 35 cm. The substrate consists of gravels with an overlying layer of organics. A patch of cleaned gravel was present, possibly the result of spawning suckers.

There is lots of deadfall across the creek in the proximity of the lake. Surface outlet flow disappears approximately 400 m downstream of the lake, leaving a channel overgrown with grasses and devils club. Flow at this stage may be subterranean to Holder Creek.

Fisheries enhancement potential for the outlet appears to be low.

See Fisheries Management Comments for outlet enhancement options.

Lake: **BUTTERNUT**

FISHERIES MANAGEMENT COMMENTS

Butternut Lake supports a large population of lake Whitefish and longnose sucker, with 2 overnight net sets yielding 179 lake Whitefish (size range 11.6 - 35.0 cm) and 219 longnose sucker (size range 9.7 - 48.0 cm), respectively. In addition, minnow trapping produced lake chub and longnose sucker juveniles.

Several possible management strategies exist for Butternut Lake. They are:

1. Stock with rainbow trout and manage for a moderate use fishery once road access is established. An initial spring stock of 10,000 (10 gram) native rainbow trout is suggested.
   A continuous stocking program is required as no salmonid spawning habitat presently exists in the outlet (only shore spawning lake Whitefish, longnose sucker and lake chub inhabit the lake). If beaver dams are removed from the outlet and spawning gravel introduced, the relatively small Butternut Lake watershed may not support a running outlet into the summer months. Any outlet enhancement may only act to relieve a spawnbound condition resulting from stocking and not provide natural recruitment to the lake.
   Competition between stocked rainbow and the large, well established Whitefish and sucker populations may occur. Stock assessment should be undertaken 3 years after the initial stocking. If the rainbow are not doing well, other management options do exist and can be resorted to if deemed desirable and technically sound.

2. At the time of survey, it was noted that the outlet creek dries up or goes subterranean approximately 400 m downstream of the lake. The outlet creek near the lake lies in a V-shaped valley approximately 30 metres wide with a height of 10 metres. It may be possible to completely dam off the outlet near the lake with an earth dam, rendering the lake a closed system. This would allow for eastern brook trout to be stocked into Butternut Lake. Brook trout may feed on the large lake chub population and shore spawn more readily, alleviating any eggbound problems. One possible drawback is to increase lake level such as to cause trees along the shoreline perimeter to drown, thus introducing more deadfall into the water with resulting hazards to boating.

Lake: **BUTTERNUT**

FISHERIES MANAGEMENT COMMENTS: con't

3. With a well defined shoreline, little marsh area, no inlets and an outlet with sufficient gradient for a coarse fish barrier (when flowing), Butternut Lake is a prime candidate for a chemical rehabilitation. Prior to this project, the outlet should be assessed at peak spring runoff. If surface flow is present to Holder Creek, a coarse fish barrier will be required to stop coarse fish (especially northern Squawfish) from migrating upstream from Holder C./Tudyah Lake. A suitable gradient for a barrier exists anywhere in the first 300 m of outlet. Stocking would allow for the development of a monoculture rainbow trout fishery. This project is feasible only after the establishment of road access.

HISTORY OF PREVIOUS SURVEYS

Lake Surveys:

None known.

Other Related Surveys:

None known.

Lake: **BUTTERNUT**

WATER CHEMISTRY SUMMARY **Limnology Station No. 1**

Field Conditions:

Date:	June 22, 1990		
Time:	0900 hrs	Air Temperature:	20°C
Wind Velocity:	0 km/hr	Wind Direction:	N/A
Cloud Cover:	2/10o.c.	Surface Condition:	flat
Secchi Disc:	8.35 m	Water Colour:	bluish-green

Method(s) Used:

Dissolved Oxygen:	YSI model 58 oxygen/temperature meter
Water Temperature:	YSI model 58 oxygen/temperature meter
Air Temperature:	Hand-held alcohol thermometer
pH (field):	Digital pH pocket tester
H2S (field):	Hach H2S field test kit
Laboratory Used:	Zenon Environmental Inc. B.C. Laboratory Services
Water Sampler:	Verticle Alpha Water Bottle (Vandorn)
Substrate Sampler:	Substrate sample not taken

Water Sample Chemistry: SEAM Site No.: Not determined

	Sampling Depths	
	Surface (O m)	Lower (10.5 m)
pH (field)	8.3	8.2
pH (lab)	8.3	8.0
Specific Conductance (lab)	107 umhos/cm	111 umhos/cm
Filterable Residue 105°C (lab)	60 mg/l	66 mg/l
H2S (field)	-- mg/l	0.0 mg/l

Bottom Depth:	11.6m
Substrate Sample Depth:	-- m

Comments:

Suspended matter is present throughout the water column.

Lake: **BUTTERNUT**

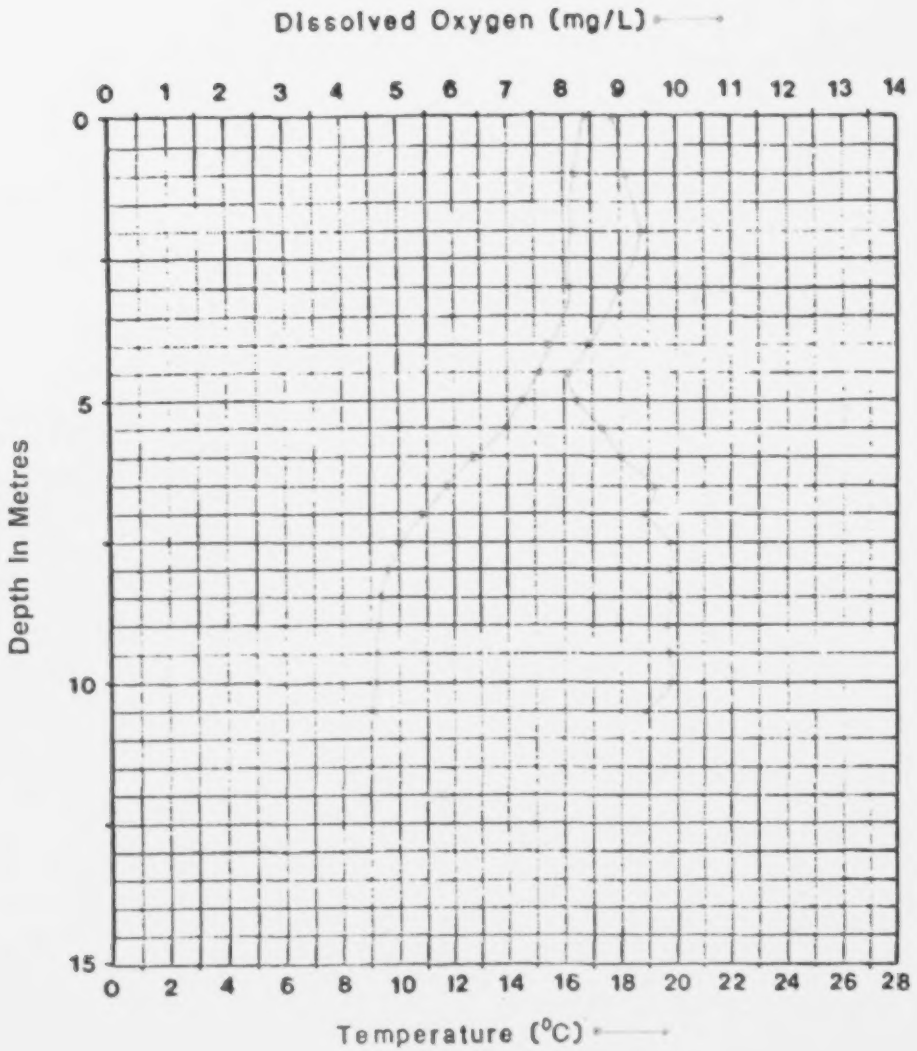
DATE: June 22, 1990

SUMMER OXYGEN/TEMPERATURE DATA

Depth (m)	02 (mg/l)	Temp (°C)
surface	8.9	16.9
1.0	9.2	16.4
2.0	9.4	16.3
3.0	9.0	16.2
4.0	8.4	15.5
4.5	8.1	15.1
5.0	8.3	14.6
5.5	8.7	14.0
6.0	9.0	12.8
6.5	9.6	11.8
7.0	9.4	10.8
7.5	9.8	10.0
8.0	9.8	9.6
8.5	9.8	9.4
9.0	9.7	9.3
9.5	9.7	9.2
10.0	9.7	9.2
10.5	9.4	9.1
11.6	Bottom	

Comments:
Lake is well oxygenated to bottom.

DISSOLVED OXYGEN AND TEMPERATURE PROFILE



Lake: **BUTTERNUT**

NETTING RECORD

Mesh sizes experimental order: 25, 76, 51, 89, 38, 64 mm

NETTING SITE #1

Type:	Sinking monofilament		
Date Set:	June 20, 1990	Time:	1600 hrs
Date Lifted:	June 21, 1990	Time:	1500 hrs
Net Dimensions:	Length: 91.4 m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm	Depth:	2.5 m
		Substrate:	organics
Deep End Mesh Size:	64 mm	Depth:	8.5 m
		Substrate:	organics

Comments:
Lake whitefish and longnose suckers throughout the net.

NETTING SITE #2

Type:	Sinking monofilament		
Date Set:	June 20, 1990	Time:	1630 hrs
Date Lifted:	June 21, 1990	Time:	1130 hrs
Net Dimensions:	Length: 91.4 m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm	Depth:	3.0 m
		Substrate:	organics
Deep End Mesh Size:	64 mm	Depth:	9.0 m
		Substrate:	organics

Comments:
Lake Whitefish and longnose suckers throughout the net. Some of the longnose suckers have black spot disease and/or red fins and/or lesions on the lower posterior end.

Lake: **BUTTERNUT**

LAKE CATCH SUMMARY

SPECIES	NET SITE NO.				ANGLED	OTHER	TOTAL	NUMBER SAMPLED	NUMBER PRESERVED	SIZE RANGE (cm)
	1	2	3	4						
Lake whitefish	106	73			-	-	179	*30	-	11.6 - 35.0
Longnose sucker	129	90			-	-	219	-	-	9.7 - 48.0

Comments:

* An additional 20 lake Whitefish were sampled for length/weight data only.

Minnow Traps:

BAIT: Sardines

#	HOURS	DEPTH (m)	SUBSTRATE	SPECIES	SIZE RANGE (cm)
1	21	0.3	organics	127 Lake chub 3 Longnose sucker 7 leeches	as per minnow trap #2
2	17	0.5	organics	162 Lake chub 3 Longnose sucker 36 leeches	4.6 - 9.5 average 5.6

Comments:

Lake: **BUTTERNUT**

INDIVIDUAL FISH DATA

Date Captured: June 20. 21. 1990

Method of Capture: Sinking monofilament gillnet

M -Male
F -Female
? -Not Obvious

IMM -Immature
MG -Maturing
MT -Mature
GV -Gravid
SP -Spent
? -Not Obvious

EG -Egg
FR -Fin Ray
HD -Head
ML -Milt
OT -Otolith

SC -Scale
ST -Stomach
TG -Fish Tag
WF -Whole Fish

Species	Fork Length (cm)	Weight (g)	Sex	Gonadal maturity	Sample Type	Age (yr)	Stomach Contents Plankton	Insects	Fish	Other	Comments
Lake whitefish	11.6	20	?	IMM	SC	1+					
L W F	11.8	20	?	IMM	SC	1+					
L W F	13.2	30			SC	2+					
L W F	15.5	50	?	IMM	SC	2+					stomach empty
L W F	17.2	60	M	IMM	SC	3+	plankton				
L W F	17.3	70	F	IMM	SC	4+					stomach empty
L W F	18.2	75	F	IMM	SC	3	plankton				
L W F	18.7	90	F	MG	SC	3+		winged insects			
Lake whitefish	18.8	80	F	IMM	SC	4+	plankton				
L W F	20.6	115	F	MG	SC	6+	Zooplankton				
L W F	20.8	100	M	IMM	SC	4+	plankton				
L W F	21.0	115	F	IMM	SC	5+		flying insects		detritus	
L W F	21.3	115	F	IMM	SC	3+					stomach empty
L W F	21.3	120	M	MG	SC	5+		flying insects		detritus	
L W F	23.2	180	M	MG	SC	3+		flying insects		detritus	
L W F	23.5	180	F	MG	SC	3+	very little plankton				
Lake whitefish	23.7	150	M	MG	SC	4+					stomach empty
L W F	25.0	215	M	MG	SC	3+		flying insects		detritus pine needles	
L W F	25.5	220	F	MG	SC	4+		flying insects		detritus	
L W F	25.7	280	F	MG	SC	4+		flying insects		detritus	
L W F	25.9	240	F	MG	SC	5+		flying insects		detritus	
L W F	27.3	270	F	MG	SC	4+		winged insects		detritus	
L W F	27.5	295	F	MG	SC	4+		flying insects		detritus	
L W F	27.5	340	F	MG	SC	5+	plankton			detritus	
Lake whitefish	27.6	260	F	MG	SC	4+		winged insects		detritus	

Lake: **BUTTERNUT**

INDIVIDUAL FISH DATA

Date Captured: June 20. 21. 1990

Method of Capture: Sinking monofilament gillnet

M -Male
F -Female
? -Not Obvious

IMM -Immature
MG -Maturing
MT -Mature
GV -Gravid
SP -Spent
? -Not Obvious

EG -Egg
FR -Fin Ray
HD -Head
ML -Milt
OT -Otolith

SC -Scale
ST -Stomach
TG -Fish Tag
WF -Whole Fish

Species	Fork Length (cm)	Weight (g)	Sex	Gonadal maturity	Sample Type	Age (yr)	Stomach Contents Plankton	Insects	Fish	Other	Comments
Lake whitefish	28.4	290	M	MG	SC	5		winged terrestial insects		detritus	
L W F	29.0	370	F	MG	SC	3+	Gammarus sp.				
L W F	29.5	315	F	MG	SC	4+				leeches	tapeworm in body cavity
L W F	29.5	335	M	MG	SC	4+				detritus	
L W F	31.0	425	M	MG	SC	4+		flying insects		detritus	
LENGTH AND WEIGHT DATA ONLY ON THE FOLLOWING:											
L W F	17.4	65									
L W F	18.3	80									
L W F	18.3	60									
L W F	19.0	90									
L W F	19.5	95									
L W F	19.5	85									
L W F	19.6	100									
L W F	19.6	100									
L W F	20.8	120									
L W F	22.0	150									
L W F	22.6	150									
L W F	23.3	180									
L W F	24.7	205									
L W F	24.8	210									
L W F	26.0	210									
L W F	27.5	240									
L W F	29.9	410									
L W F	30.6	400									
L W F	33.0	480									
Lake whitefish	35.0	600									

129 additional Lake Whitefish were captured, but were not sampled.

Age determination completed under contract by:
Margaret McDonald
Box 243, Midway, B.C., VOH 1 MO

Lake: **BUTTERNUT**

PHOTOGRAPHDIRECTORY

Negative #	Plate #	Description
R4:4	1	Aerial view of Butternut Lake looking north.
R4:5	2	Aerial view of Butternut Lake looking south.
R4:11,12	3	Panoramic view of Butternut Lake shoreline looking north from middle of lake. Microwave dish and bedrock outcrop are visible to the left (west shore) in photo.
R4:13,14	4	Panoramic view of Butternut Lake shoreline looking south from middle of lake.
R4:16	5	View of outlet looking downstream from beaver dam located approximately 20 m downstream from lake. Deadfall obscures outlet at this point.
R4:15	6	View of outlet looking upstream at beaver dam located approximately 20 m downstream from lake. This old, overgrown dam is 5.1 m in length and 0.8 m in height.

Lake: **BUTTERNUT**

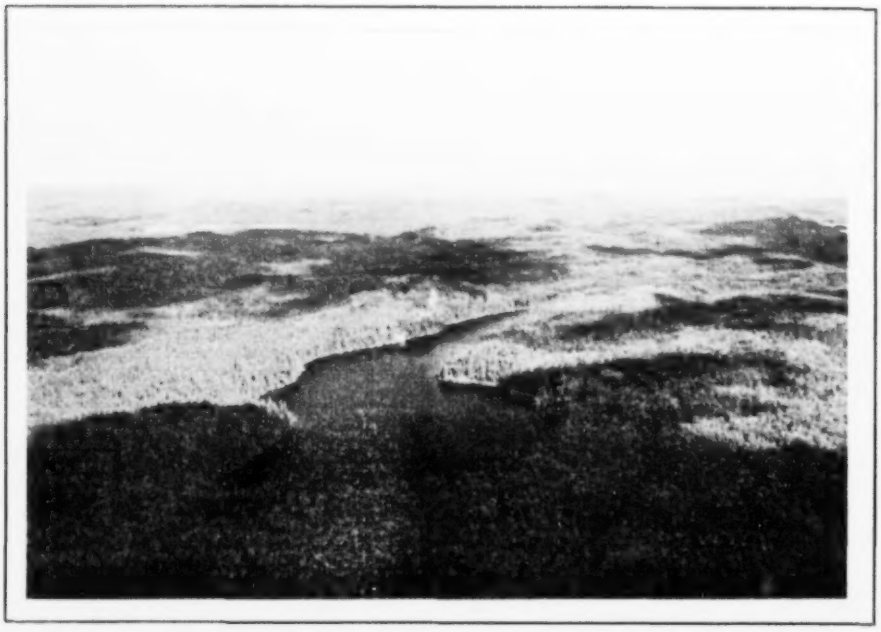


Plate 1: Aerial view of Butternut Lake looking north.

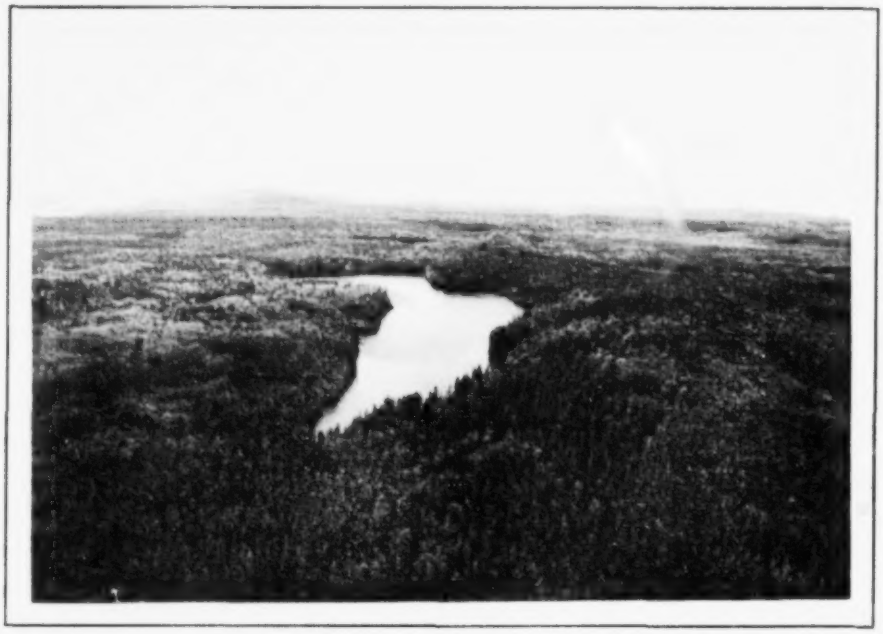


Plate 2: Aerial view of Butternut Lake looking south.

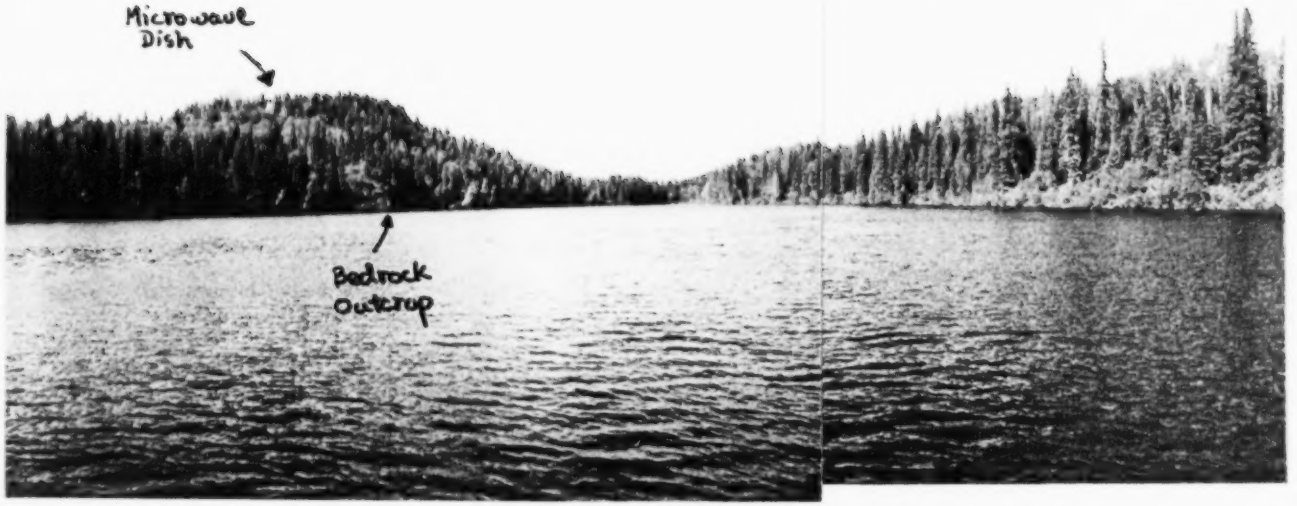


Plate 3: Panoramic view of Butternut Lake shoreline looking north from middle of lake. Microwave dish and bedrock outcrop are visible to the left (west shore) in photo.

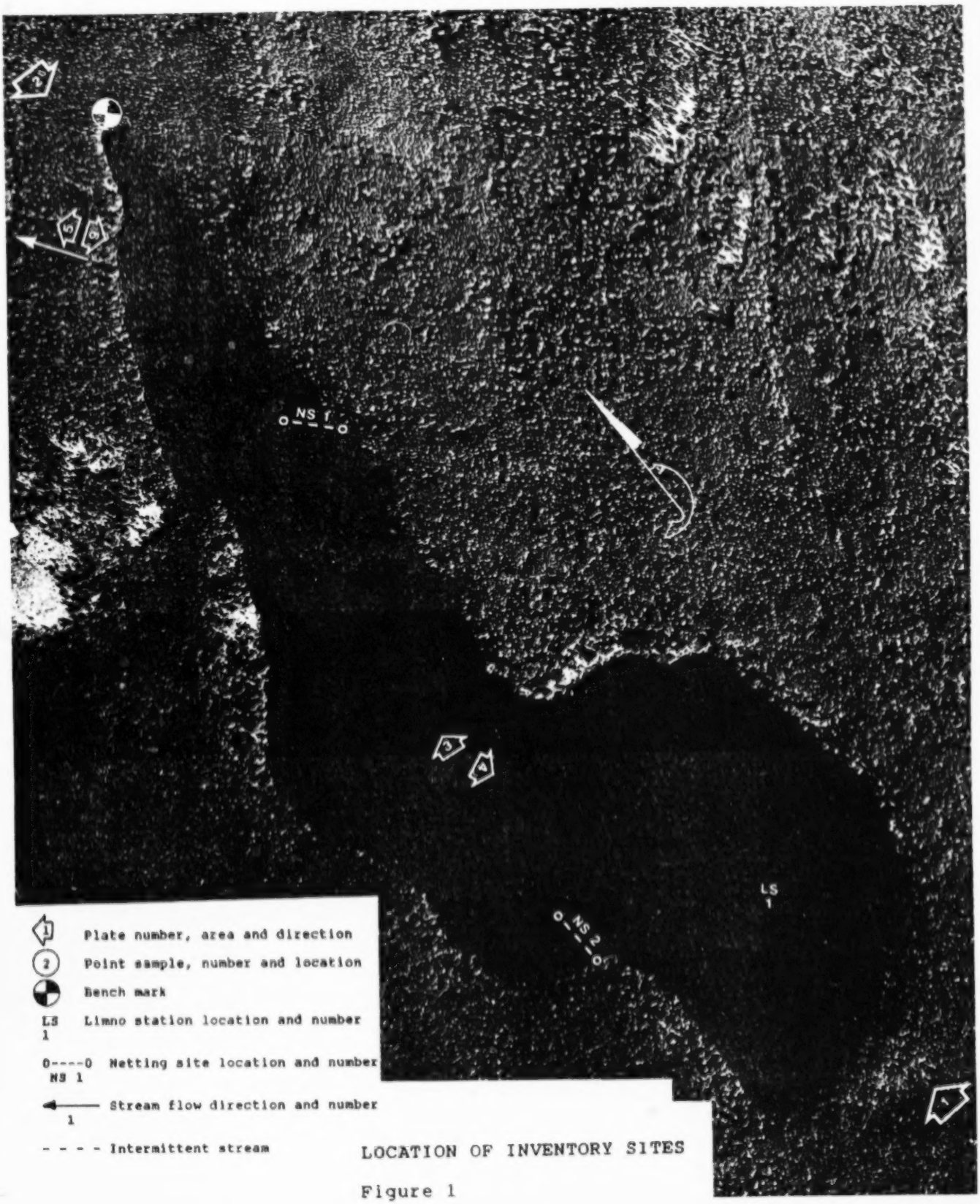
Lake: **BUTTERNUT**

Plate 4: Panoramic view of Butternut Lake shoreline looking south from middle of lake.

Lake: **BUTTERNUT**

Plate 5:
View of outlet looking downstream from beaver dam located approximately 20 m downstream from lake. Deadfall obscures outlet at this point.

Plate 6: View of outlet looking upstream at beaver dam located approximately 20 m downstream from lake. This old, overgrown dam is 5.1 m in length and 0.8 m in height.



LOCATION OF INVENTORY SITES

Figure 1

Lake: Butternut
Reference No.: B.C. 7443 No.191
Reference Date: September 3, 1972
Scale: 1: 5513

Lake: BUTTERNUT

Appendix A

LABORATORY REPORT

Water Chemistry Analysis

B.C. MINISTRY OF ENVIRONMENT
JUL 06 1990
RECEIVED
PRINCE GEORGE

22-Jul-90 ICHON ENVIRONMENTAL INC. Page 1
B.C. LABORATORY SERVICES
Report for File: 0000039

FISH - PRINCE GEORGE Attn: DUANE JESSON Sample 90004705

Site: NOSITE BUTTERNUT LAKE

From 90/06/22 0001 To 90/06/28 0001
Depth Name: 0.0 0.0 Fish
Sample Site: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Source/Code/Reference)
pH	8.2	pH units	Automated pH/Meter (00/M10/30/02/01)
Residue Nonfilt.	1	mg/L	Grav. 7 Ca Burner 105C (00/W10/70/02/01)
Specific Conductance	197	uS/cm	Cond.Meter Manual (00/M10/20/02/01)
Hdn. Filtrable A Ca	60	mg/L	Gravimetric (00/M10/30/02/01)
Hardness Total as	60.1	mg/L	Automated Electrometric (00/M10/10/02/01)

10.5m

Reduced to
33%
of Original

INSET MAP

STATISTICS AT TIME OF SURVEY

ELEVATION	747 m.s
SURFACE AREA	391 000 sq.m
AREA ABOVE 6m CONTOUR	110 000 sq.m
VOLUME	2 375 000 cu.m
MEAN DEPTH	7.1 m
MAX. DEPTH	12.0 m
PERIMETER, MAIN BASIN	3 675 m
TRANSECTS, GLASSIS	— m
BEACH MARK HEIGHT ABOVE WATER LEVEL	2.0 m

RECREATIONAL FISHERIES BRANCH
HABITAT MANAGEMENT SECTION

BUTTERNUT LAKE

DEPTHS IN METRES

1:2 000

930/3